

WHAT IS CLAIMED IS:

1           1.    A negative electrode for a lithium secondary battery  
2    prepared by forming an active material layer comprising active  
3    material particles of silicon and/or a silicon alloy and a binder  
4    on a current collector comprising an electrically conductive metal  
5    foil, and sintering the active material layer on the current  
6    collector under a non-oxidizing atmosphere, wherein said active  
7    material particles are primary particles having a mean diameter of  
8    not greater than 1  $\mu\text{m}$ , the primary particles are dispersed  
9    uniformly in the active material layer, and the primary particles  
10   and the binder are uniformly mixed and distributed.

1           2.    The negative electrode according to claim 1, wherein the  
2    active material is silicon.

1           3.    The negative electrode according to claim 1, wherein a  
2    surface roughness (Ra) of a surface of the current collector is at  
3    least 0.2  $\mu\text{m}$ .

1           4.    The negative electrode according to claim 2, wherein a  
2    surface roughness (Ra) of a surface of the current collector is at

3     least 0.2  $\mu\text{m}$ .

1           5.     The negative electrode according to claim 1, wherein the  
2     current collector is a copper foil, a copper alloy foil or a metal  
3     foil having a copper layer or a copper alloy layer on a surface  
4     thereof.

1           6.     The negative electrode according to claim 1, wherein the  
2     current collector is an electrolytic copper foil, an electrolytic  
3     copper alloy foil or a metal foil having an electrolytic copper  
4     layer or an electrolytic copper alloy layer on a surface thereof.

1           7.     The negative electrode according to claim 1, wherein the  
2     binder remains after sintering.

1           8.     The negative electrode according to claim 1, wherein the  
2     binder is polyimide.

1           9.     The negative electrode according to claim 1, wherein an  
2     electrically-conductive powder is mixed in the active material  
3     layer.

1           10. The negative electrode according to claim 1, wherein the  
2 active material is silicon, a surface roughness (Ra) of a surface  
3 of the current collector is at least 0.2  $\mu\text{m}$ , the current collector  
4 is an electrolytic copper foil, an electrolytic copper alloy foil  
5 or a metal foil having an electrolytic copper layer or an  
6 electrolytic copper alloy layer on the surface, the binder remains  
7 after sintering, and the binder is polyimide.

1           11. A method for preparing a negative electrode for a lithium  
2 secondary battery comprising

3           preparing a slurry comprising an active material in a binder  
4 solution, wherein the active material comprises silicon and/or a  
5 silicon alloy having an average diameter of primary particles of  
6 less than 1  $\mu\text{m}$  and which is broken apart into the primary particles  
7 in the binder solution;

8           coating the slurry on a current collector comprising a metal  
9 foil to form an active material layer; and

10          sintering the active material layer on the current collector  
11 under a non-oxidizing atmosphere.

1           12. The method for preparing a negative electrode according  
2 to claim 11, wherein sintering is performed under conditions such

3     that the binder remains after heat treatment.

1           13. The method for preparing a negative electrode according  
2     to claim 11, wherein the active material layer is press rolled  
3     together with the current collector before sintering.

1           14. The method for preparing a negative electrode according  
2     to claim 12, wherein the active material layer is press rolled  
3     together with the current collector before sintering.

1           15. A lithium secondary battery comprising: a negative  
2     electrode according to any one of claims 1 to 10, a positive  
3     electrode comprising a positive electrode active material, and a  
4     nonaqueous electrolyte.

1           16. A lithium secondary battery comprising: a negative  
2     electrode prepared by a method according to any one of claims 11 to  
3     14, a positive electrode comprising a positive electrode active  
4     material, and a nonaqueous electrolyte.